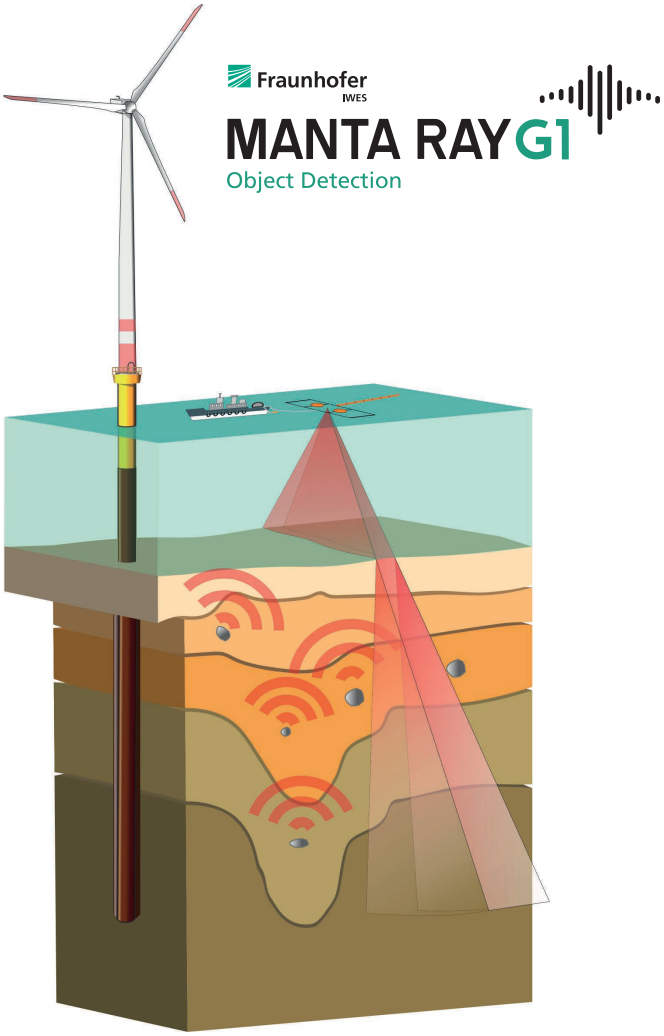
Fraunhofer IWES

Data and facts

Manta Ray G1
Sub-seafloor object detection

During the construction of offshore infrastructure like e.g. offshore wind turbines, boulders and other geological features (shallow gas accumulations, cohesive strata) may pose a risk to the installation. In particular, boulders in the sediment can cause damage to the driven piles during installation of the support structures. Potential termination of installation and extended delays can result in high costs for wind farm developers. Accurate knowledge of the sub-seafloor geology (e.g., position of boulders in the sub-seafloor) allows for efficient, small-scale micro-siting of the foundations, thus minimizing the installation risks.

The Manta Ray G1 is a novel data acquisition system developed by Fraunhofer IWES and the University of Bremen specifically for the purpose of diffraction imaging and the localization of point diffractors (e.g. boulders) within marine sediments. The specially designed acquisition geometry of the Manta Ray G1, together with synthetic aperture processing, allows blanket coverage of the survey area, resulting in excellent overall data coverage as well as time- and cost-efficient survey operations.

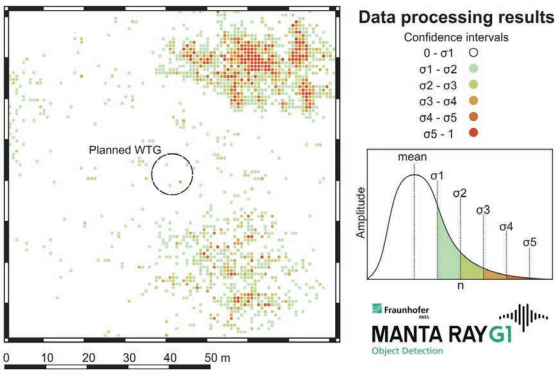


Our competences at a glance

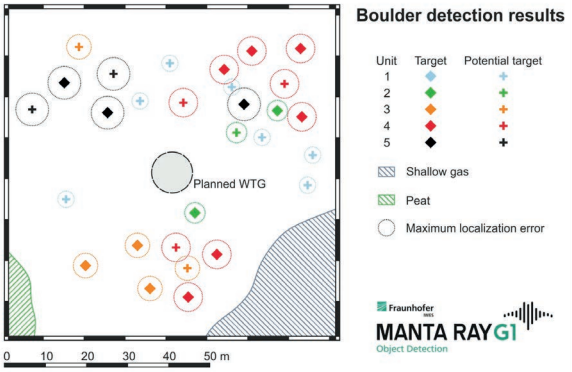
- Dedicated diffraction imaging for sub-seafloor object detection
- Identification and localization of targets > 0.5 m up to full foundation depth
- Swath imaging for time- and cost-efficient survey operations
- Simultaneous UHR reflection survey

Services

- Fit-for-purpose risk assessment for offshore foundation planning
- Identification and localization of targets > 0.5 m size
- Full depth imaging for comprehensive risk assessment of total foundation depth (min. 2x water depth)
- Tailored data acquisition and processing for sub-seafloor diffraction imaging
  - Diffraction imaging for object detection
  - Swath imaging for time-efficient surveying
  - High localization accuracy with synthetic aperture processing
- Specialized processing algorithms for diffraction imaging including reflection-diffraction separation and beamforming
- 3D diffraction energy volume generation used for interpretation
- Detailed anomaly interpretation and integration into geological model for micro-siting
- Simultaneous acquisition of UHR reflection seismic data optimized for structural/stratigraphic imaging
- Ongoing research and development for optimized efficiency and custom solutions



Statistical evaluation of diffraction amplitudes for anomaly recognition



Integrated target interpretation with local geology for foundation micro-siting

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Further information

Fraunhofer IWES secures investments in technological developments through validation, shortens innovation cycles, accelerates certification procedures, and increases planning accuracy by means of innovative measurement methods in the wind energy and hydrogen technology sectors. At present, there are more than 300 scientists and employees as well as around 150 students employed at the eight sites: Bochum, Bremen, Bremerhaven, Görlitz, Hamburg, Hanover, Leuna and Oldenburg.

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